LAWRENCE LIVERMORE
REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory, Jan. 31-Feb. 4, 2011

Superbugs go down the drain

Scientist have found a way to combat antibiotic resistant bacteria by using the bacteria's own genes.

Laboratory researchers have discovered a new way to combat antibiotic resistant bacteria, or superbugs, by using the bacteria's own genes.

LLNL's Paul Jackson and his team have taken a new approach to combating antibiotic resistant bacteria by developing a new generation of antibiotics, based upon a much deeper understanding of the bacteria's own genes. The method consists of turning the pathogens' own genes and processes against it.

CNN recently featured an interview with Jackson and visited his lab to see how the technique works.

"Rather than looking for a more traditional solution to the problem and perhaps finding a chemical or antimicrobial solution, we decided to harness genetic sequencing and take a closer look at the makeup of the pathogen's DNA," Jackson said.

To watch the segment, go to the Web.

Seeing green through NIF

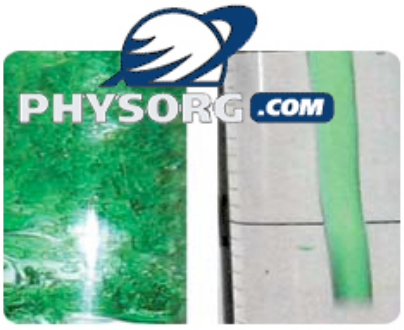
Inside the NIF target chamber

Fusion, the same force that powers our sun and the stars, holds promise as a limitless supply of clean energy. Lawrence Livermore scientists continue to move closer to making fusion energy in a laboratory setting a reality, using the National Ignition Facility, the world's largest and most energetic laser.

NIF will use 192 lasers to fuse atoms of deuterium and tritium, resulting in energy. Recently, “This Week in Technology,” which provides cutting edge science and technology "netcasts," featured NIF as one of the Top 25 Green Tech Innovators. Host Kirsten Sanford, aka Dr. Kiki, visited Mike Dunne, program director for Fusion Energy Systems, and Bruno van Wonterghem, NIF operations manager, for an update on NIF's progress.

The show is available on the Web.

Cornstarch isn't just for cooking



At left, highly turbulent behavior as water flows into (clear) oil. At right, all turbulence is suppressed by using cornstarch.

A substance more like quicksand and less like ketchup could improve the "top kill" method of

plugging a blown-out oil well.

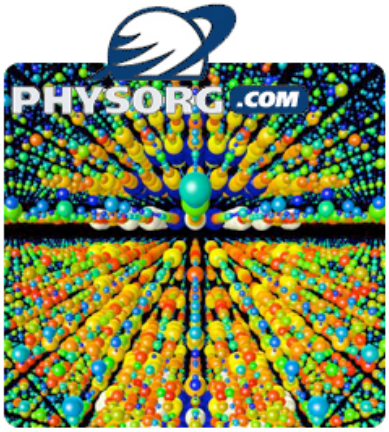
New research by Laboratory scientists in collaboration with a Washington University researcher suggests that a new "mud recipe" using materials such as cornstarch to create a more viscous formula for plugging up a spewing oil well might just work in the future.

In May 2010, BP started a top-kill procedure, in which it would pump heavy mud down the wellbore in an attempt to stop the oil flow coming out of the Macondo well in the Gulf of Mexico. It would take three months before the oil spill was stopped in July by capping the gushing oil head.

The new top-kill method involves overcoming a form of turbulence, which physicists call the Kelvin-Helmholtz instability. This instability can occur whenever two fluids move past one another at different speeds as when a heavier liquid like drilling mud is poured into a lighter liquid like crude oil. The trick is to create a liquid that resists the instability by becoming thicker and even hard like a solid under stress, but otherwise flows like a thin fluid.

To read more, go to the Web.

The power of the X-ray



3-D structure of protein nanocrystals

The unique capabilities of the world's first hard X-ray free-electron laser -- the Linac Coherent Light Source, SLAC National Accelerator Laboratory -- could revolutionize the study of life.

In one study, Livermore scientists and an international research team used the LCLS to demonstrate a shortcut for determining the 3-D structures of proteins. The laser's pulses of X-ray light pulled structural data from tiny protein nanocrystals, avoiding the need to use large protein crystals that can be difficult or impossible to prepare. This could lop years off the

structural analysis of some proteins and allow scientists to decipher tens of thousands of others that are out of reach today, including many involved in infectious disease.

In a separate STUDY, the same team reported making the first single-shot images of intact viruses, paving the way for snapshots and movies of molecules, viruses and live microbes in action.

To read more, go to the Web.

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

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